Reducing the Threat of Nuclear, Biological, and Chemical Proliferation and Terrorism

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November 4, 1996

TWG Briefing

Strategic direction

Strengthen and apply the Laboratory's science and technology base to reducing the threat of nuclear, biological, and chemical (NBC) proliferation and terrorism

Tactical goal

- Support establishing a national agenda for reducing the threat of NBC proliferation and terrorism
- Broaden the DOE's role to include the biological and chemical threat areas
- Position Los Alamos as a major resource with DOE, DoD, the intelligence community, and other federal agencies

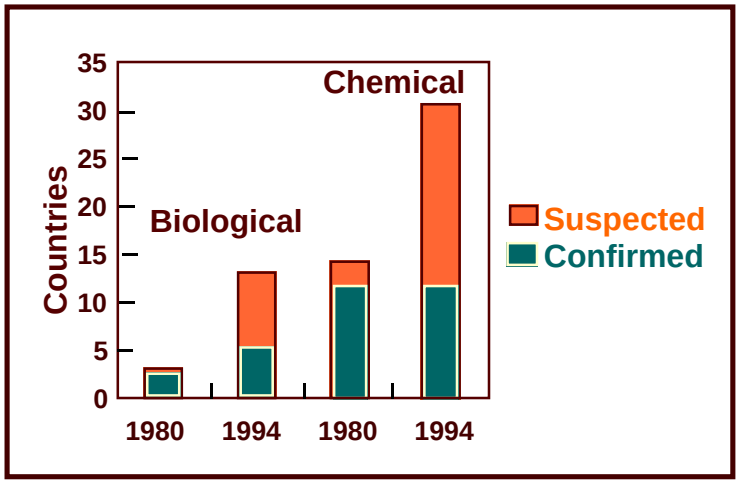
Why are Biological/Chemical Weapons a Serious Threat?

Revolutionary advances in biotechnology coupled with potential use by rogue states and terrorists

- Accelerating global availability of bio-information
- Increasing numbers of bio-trained personnel worldwide
- Growing number of international technology suppliers
- Improving indigenous capabilities

Real and increasing threat of chemical agent use by states and terrorists

- Iran–Iraq war
- Gulf war
- Tokyo subway incident
- Libya



Tactic 4: LANL/Harvard National Conference

- Invited experts in NBC
- Domenici, Glenn, Lugar, Nunn, Stevens
- Leaders from government agencies and other DOE labs
- Heighten awareness /aid legislation
- Successful

Addresses success measures and targets 1, 2 & 3

- Promoting development of national policies, support DOE/NN, establish a role for LANL

National Conference

Tactic 3

Work with other federal sponsors . . .

- DoD/Chemical and Biological Matters
- DoD/Counterproliferation Support Program
- Counterterrorism Technical Support Working Group
- DCI Nonproliferation Center
- CIA
- CIA/Office of Weapons, Technology and Proliferation/Nuclear, Chemical and Biological Division
- DIA/TWP
- HHS/PHS/CDC
- Additional organizational contacts are in process

Addresses success measures and targets 1 & 3

- Briefings—establishing LANL role in national program in support of DOE, DoD, and other federal agencies

Tactic 5

Strengthen efforts to control BW/CW materials, technology and expertise . . .

Tactic 6

Develop in-field assessment, protection . . .

Work in Progress

Tactic 1

Establish a program development team . . . identify needs and gaps and match them with Lab capabilities

- "Gang of > 4"
  - W. Davidson, R. Okinaka, J. Phillips, J. Prommel, P. Stoutland, T. Suchocki
- Technical Teams
  - CIC, CISA, CST, EES, LS, NIS, T, TSA, X
- Identification of applicable LANL capabilities and opportunities
- TriLab partnering

Addresses success measures and targets 1 & 2

- Promoting national policy — working with DOE/NN and TriLab

FY96 IPD and LDRD/PD Projects

FY96 IPD **$465K**

FY96 LDRD/PD **$400K**

IPD: Technical Guidance by "Gang of > 4"

IPD: Bio Weapons Briefings/Education

IPD: Integrated Sensor Development

IPD: Decontamination Assessment

IPD: Scenario Development

PD: Biological and Chemical Agent Detection

PD: Data Applications for Information Analysis

PD: Universal Biological Agent Point Sensor Program

PD: Smart Film Sensors for CW Agents

PD: Detection and Characterization of Bio Weapons Agents

PD: Sensors for Detection of Bio/Chemical Warfare Agents

Tactic 2

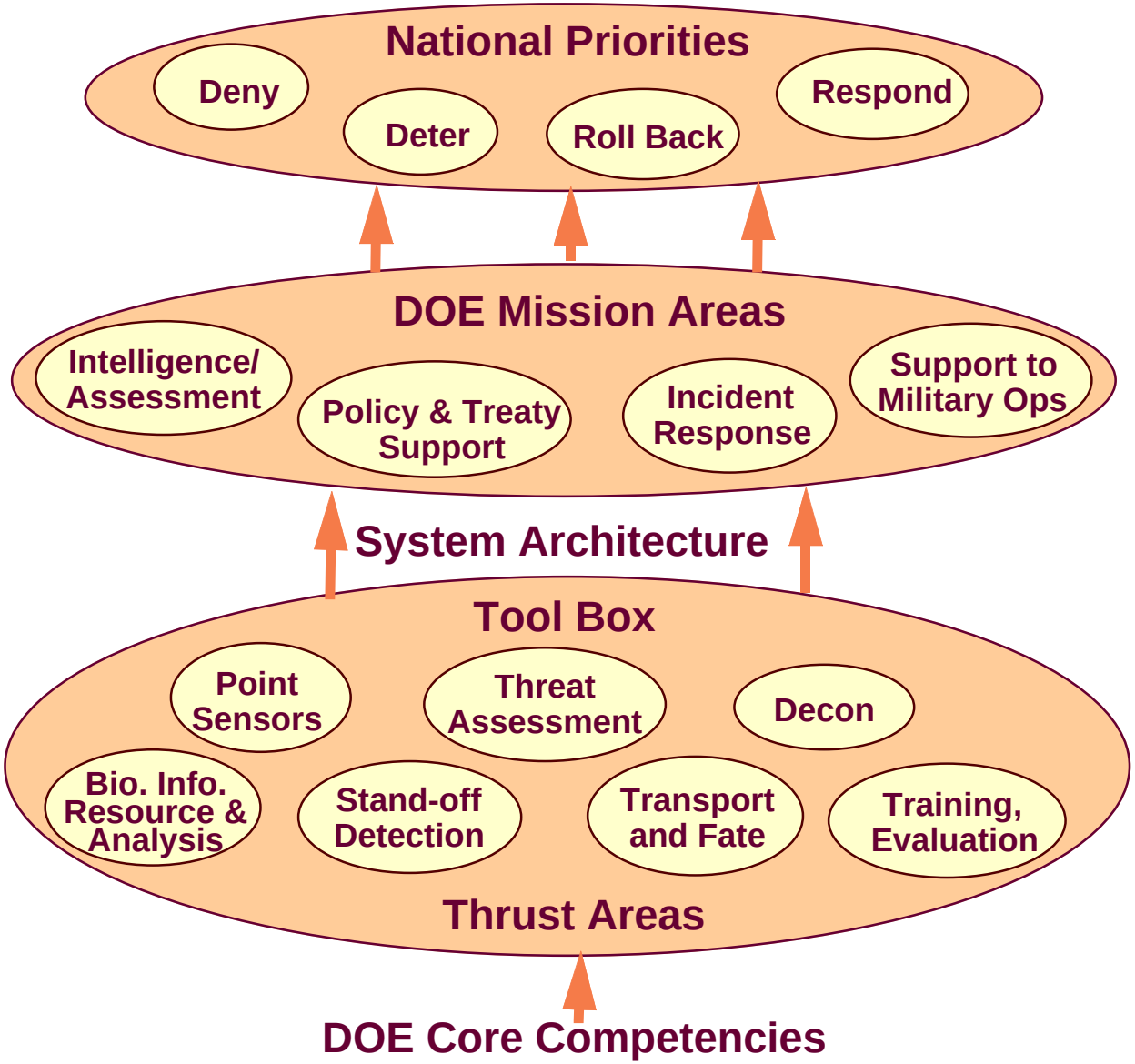
Work with DOE's Office of Nonproliferation and National Security (DOE-NN) . . . to develop a DOE strategy for reducing the NBC threat

- Nunn/Lugar/Domenici legislation
  - Congressional testimony by Cobb/Kirchner
  - National Conference, May 1996
- Science Council & Program Plan for Chem/Bio WMD
  - TriLab Response to 7 Thrusts (10/96)
  - $17M in FY97
  - $204M over 5 years
- Strong R&D component, utilizing Lab core competencies

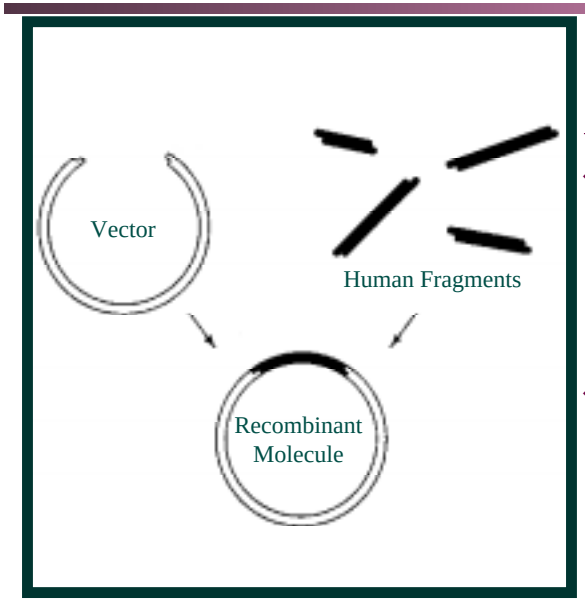
Addresses success measures and targets 1 & 2

- Promote development of policy through conferences, briefings, testimony—expand role of DOE/NN

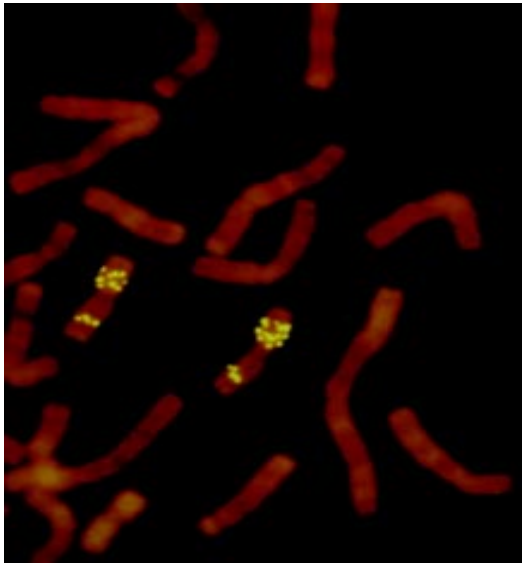
Program Builds on DOE Core Competencies through Thrust Areas to address National Needs

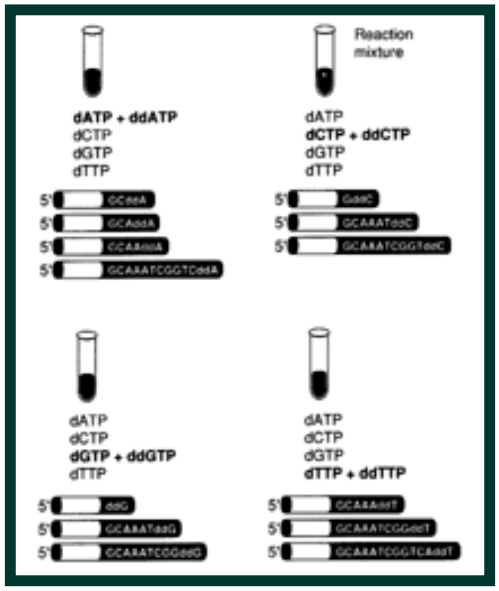


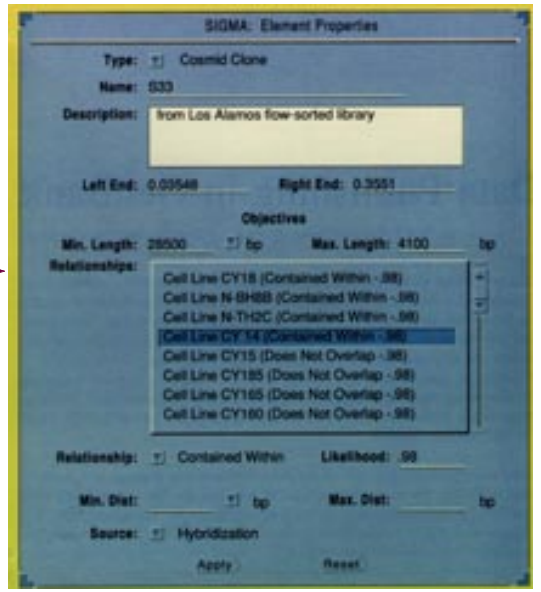
LANL Center for Human Genome Studies



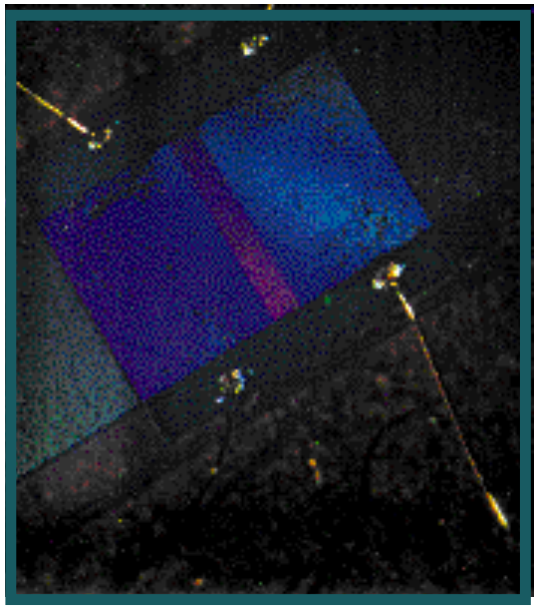
- DNA libraries
  - Cloning for mapping and sequencing
- Mapping the genome
  - Locating disease genes
  - Developing strategies
- DNA sequencing
  - Determining linear order of the genome
- Computational biology
  - Deciphering a biological *program*



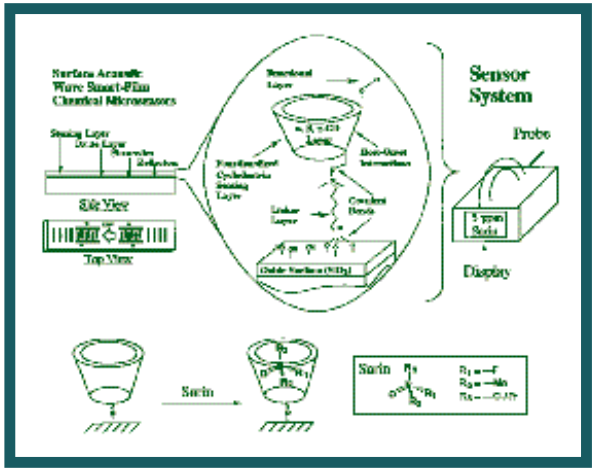




Smart Film Sensors for CW Agents



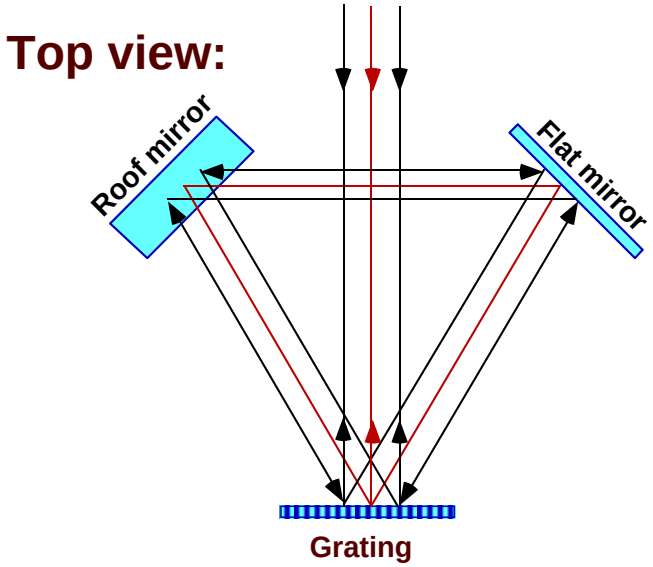
- Real-time, sensitive, rugged
- Low-power requirements
- Ability to distinguish between CW agents
- Ability to deal with complex mixture



Smart film coatings based on molecular recognition and direct covalent attachment to species selective reagents to transducer surface

- Avoid false positives (pesticides)
- Avoid false negatives (mixtures)

Spatial Heterodyne Spectroscopy (SHS)



Description

- New type IR Fourier transform spectrometer
- No moving parts, high spectral resolution
- Concentrates resolution in narrow bandwidth

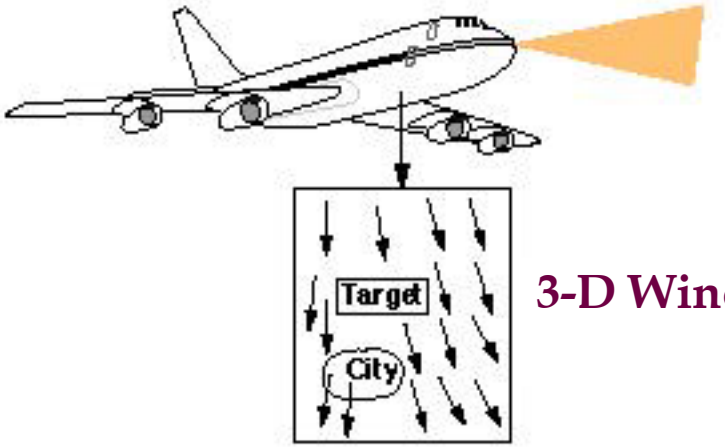
Application

- Spaceborne or airborne instrument for sensitive detection of gaseous effluents
- Pushbroom-scanned, jitter-resistant
- Ground-based applications also

The Zepherus Project Proposal

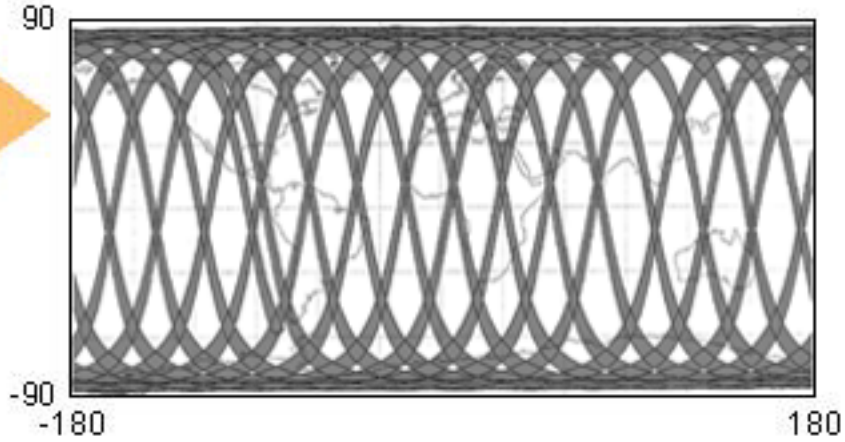
Airborne engineering prototype

- Regional wind mapping demo



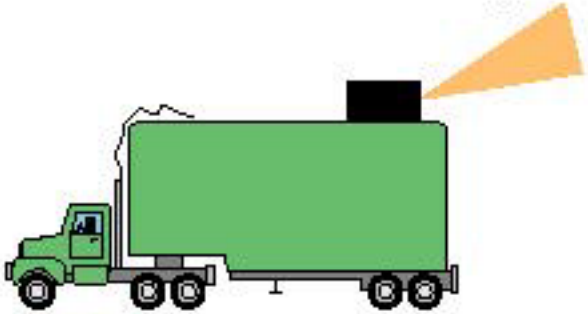
3-D Wind Map

Small SAT Global Wind Measurement Concept Demonstration



- True global coverage
- Improved match to meteorology requirements
- Good representativeness
- High utility for operational mission

Ground Experiments

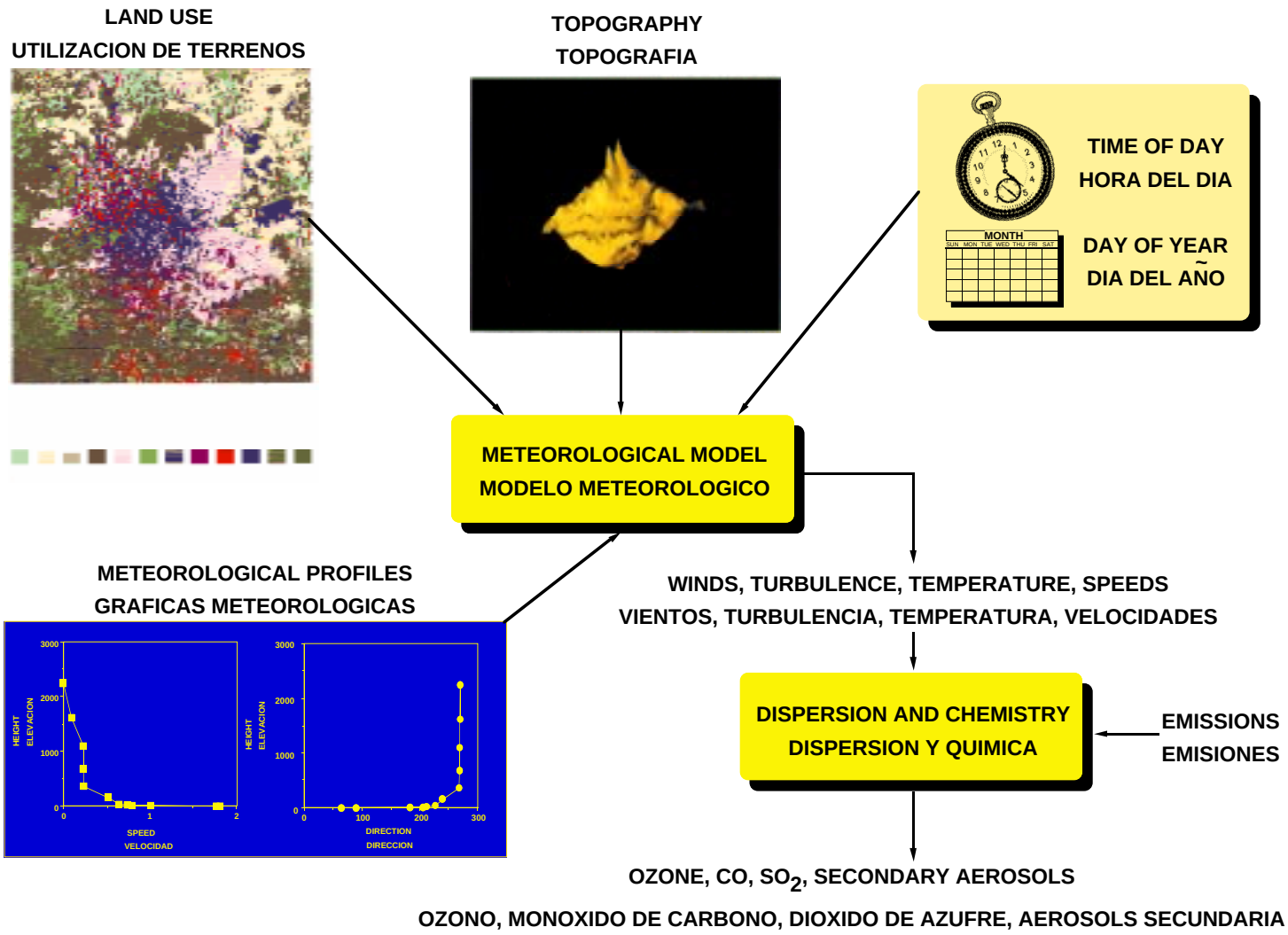


Concept/technique development

Atmospheric data collection

Meteorology research

Urban Pollution was Modeled in Detail for Mexico City



Plans for FY97

Measure 3

LANL role in national NBC program

Target

A clearly defined Lab program beginning in FY97 that engages our best efforts from across the Lab in support of DOE, DoD, and other federal agencies

FY97 IPD

Small group of TSMs from CST, LS, NIS, and TSA

- Technical guidance to DOE/NN 7 thrust areas
- Develop 5-year NBC program plan
- Work with other potential sponsors such as DoD & IC

Individual program development

FY97 LDRD/PD Projects $900K

Decontamination of Chemical and Biological Warfare Agents in the Urban Arena — W. Earl and Gary Selwyn

Field Detection of Chemical Agents by Membrane Introduction Mass Spectrometry — P. H. Hemberger

Smart Chemical Agent Detection System — Karen Grace

Universal Bio Agent Point Sensor Program Development — G. Salzman

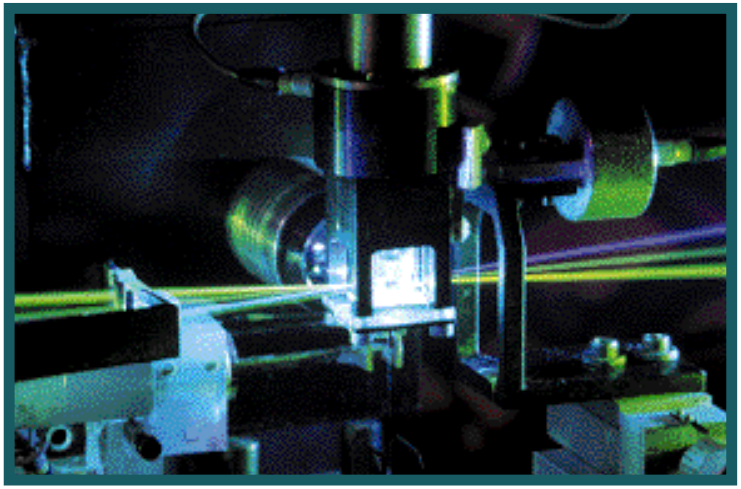
Smart Film Sensors for CW Agents — B. Swanson

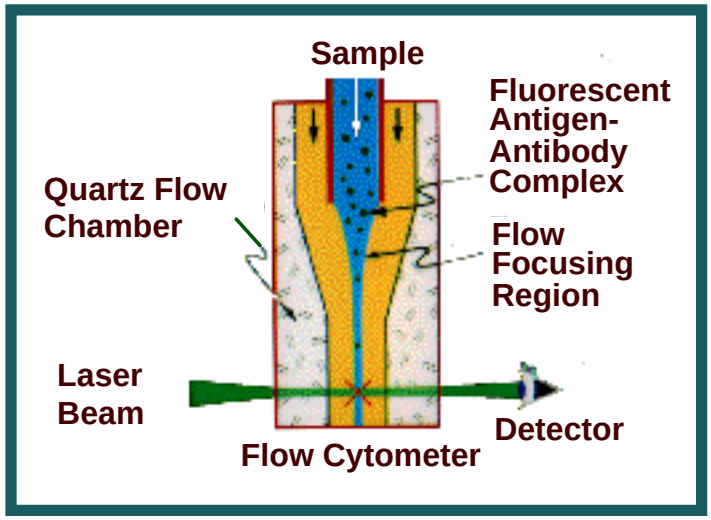
Sensors for Point Detection of Chemical and Biological Warfare Agents — T. Zawodzinski

Point Detection of Biological Agents

BIDS P31 Flow Cytometer objectives

- Compact, lightweight, low power
- Automated, simple, rugged
- Rapid bioagent identification
- Specific bacteria and toxin ID
- Militarized



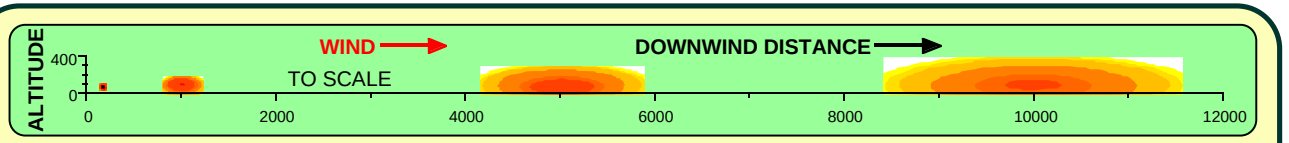


MiniFCM

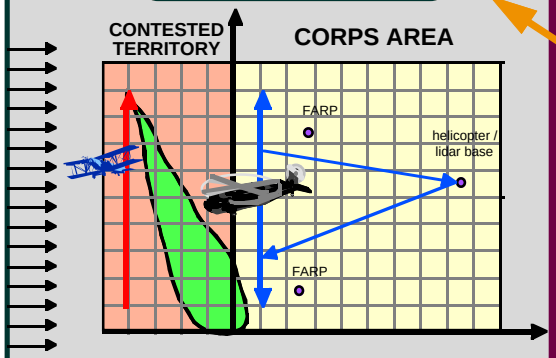
- 60 lbs (with fluid)
- < 350 W
- No user adjustments
- High performance

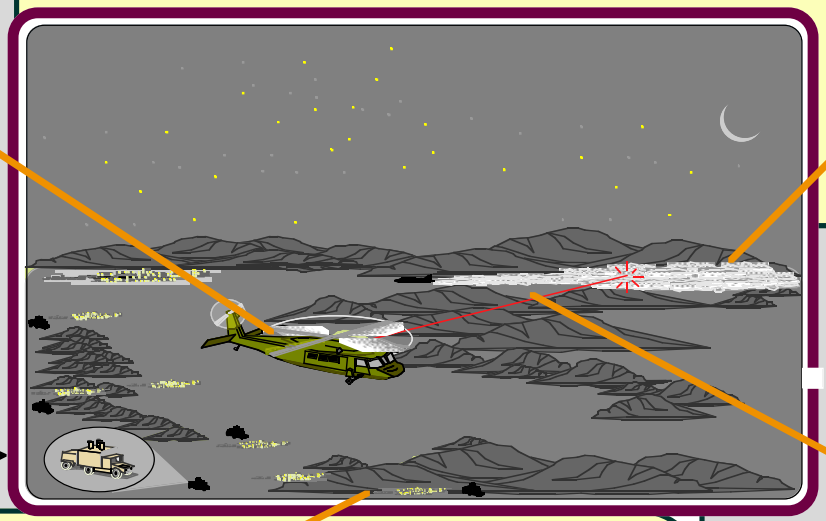
CP-Lidar Architecture Study

The "integrated" approach



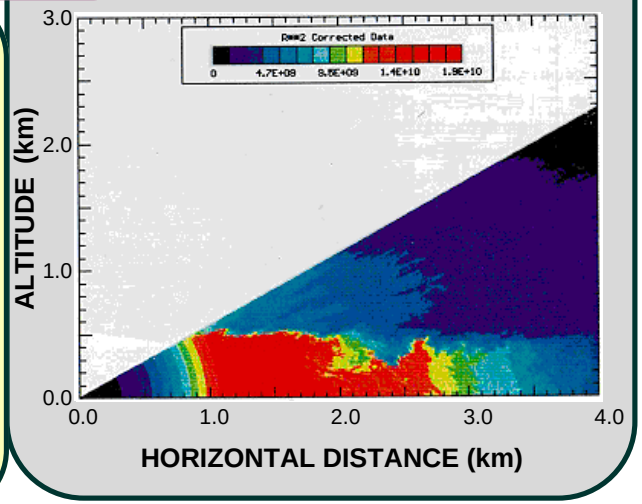
Operations Modeling



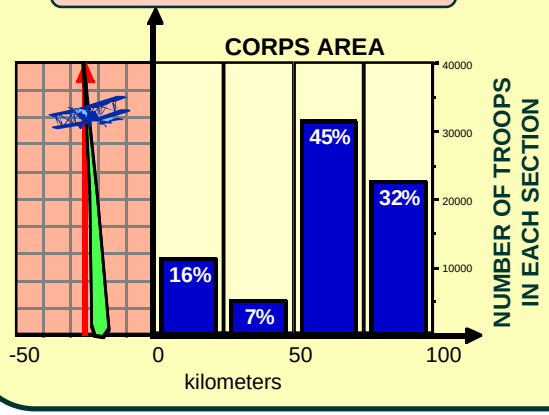


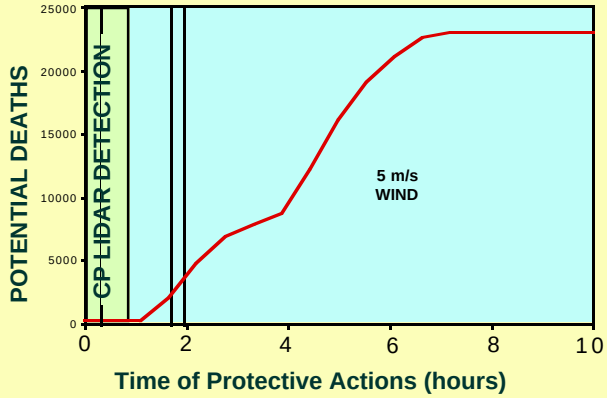
Dispersion Modeling

LIDAR Detectability Modeling



Lethality Results





JBREWS: Joint Biological Remote Early Warning System

JPO-BioDefense JBREWS Roadmap

FY97

Technology Assessment

End FY 97

Technology Selection

FY98 - Mid-FY99

ACTD Development

Mid-FY99

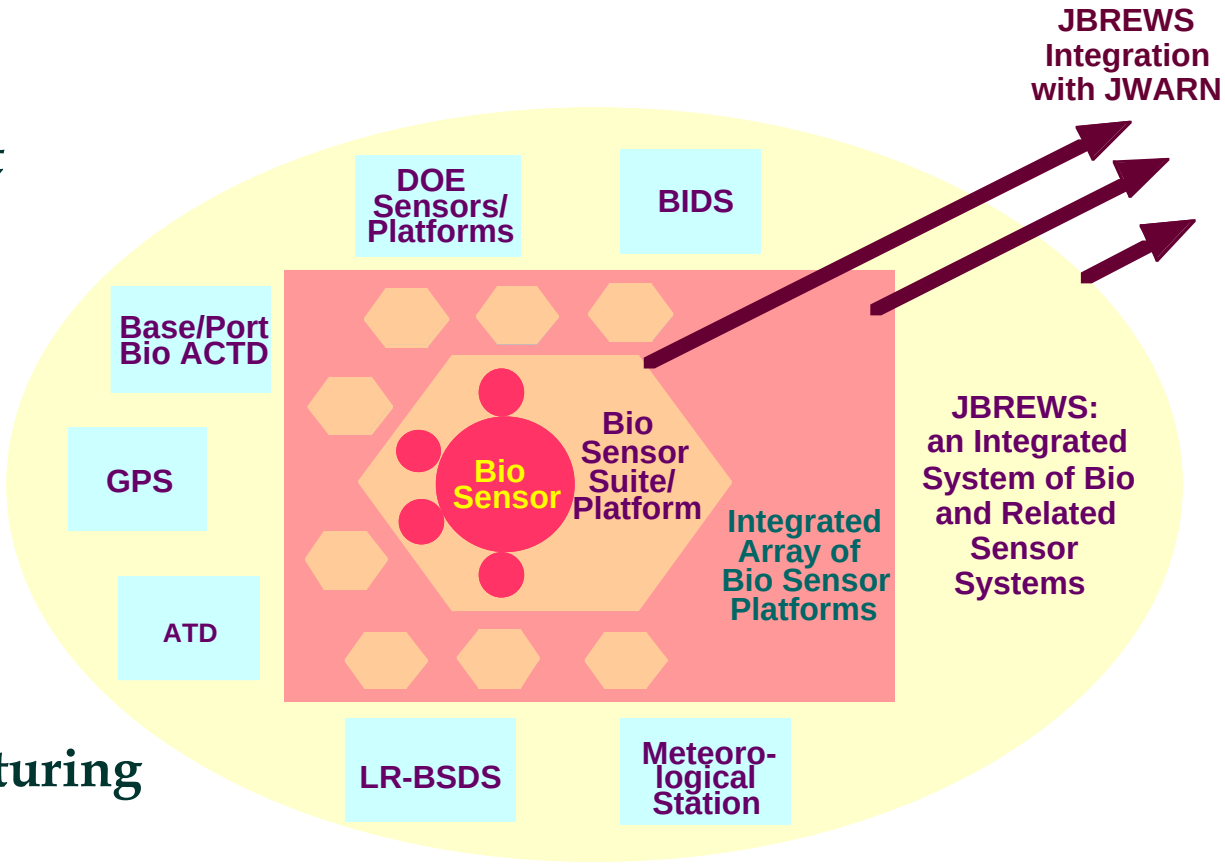
ACTD Demonstration

Mid-1999 - FY01

Engineering Manufacturing & Fielding Support

FY02 - FY03

Production



LANL/LLNL System-of-Systems JBREWS Approach

Increased funding in future years will draw upon Lab competencies

Actinide Science
Atmospheric/Groundwater Transport
Bio/Chem Processing
Counter-C/B Munitions
Crisis/Consequence Management
Decontamination/Remediation
Engineered Materials
Forensics/Attribution
Genomics Sequencing
Information Management
Inhalation Toxicology
Lab-to-Lab and Foreign Technology Exchanges
Microelectronics/Microfabrication
Modeling and Simulation
Nuclear Design
Explosive Science
Policy and Treaty Technical Support
Proliferation Analysis
Radiation Safety
Risk Analysis
Roboties/Automation
Sensors/Detection Systems
Systems Engineering/Integration
Tags & Seals
Testing Protocols and Facilities
Vulnerability/Consequence Analysis

Chem/Bio
Nuclear
Both Chem/Bio and Nuclear

Internal WWW for NBC (under construction)

Repository for

- R&D projects, deliverables, and PIs
- Program development activities and status
- Current and potential sponsors
- Links to other publications and WWW sites

Will contain this talk converted to PDF (portable document format)

//www-safeguards.lanl.gov/nbc_activities/welcome.html